

What is claimed is

1. An atomic line filter comprising

(A) a metal vapor cell having an optical entrance port and an optical exit port and  
5 containing a metal vapor defining a first excited energy state, defining a first  
resonant frequency, and a second excited energy state and having at least one  
absorption line, at or near a desired filter wavelength, said absorption line  
being equal, in energy, to a difference between the second excited state and  
the first excited state;

(B) at least one magnet for imposing on said metal vapor a magnetic field to  
10 produce polarization rotation near said at least one absorption line;

(C) a first polarizer positioned to block polarized light at a first polarization from  
entering said vapor cell through said entrance port;

(D) a second polarizer oriented perpendicular to said first polarization and  
15 located across the path of light exiting said exit port so as to block light  
exiting said vapor cell that is polarized perpendicular to said first  
polarization;

(E) a pump light source for producing light at said first resonant frequency for  
20 pumping said metal vapor from said ground state to said first excited state;

wherein said metal vapor under the influence of said magnetic field produces a  
polarization rotation of light within a narrow spectral band near said absorption line  
permitting light within this spectral band to pass through said second polarizer  
whereas all light in a much wider spectral range is not rotated in polarization and is  
25 blocked by either the first polarizer or the second polarizer.

2. The filter as in Claim 1 wherein said pump light source is a pump laser system.

3. The filter as in Claim 2 wherein said pump laser system is a diode laser system  
30 producing a pump beam

4. The filter as in Claim 3 wherein said diode laser further comprises two frequency locking etalons and two frequency detectors for monitoring sample portions of said pump beam.

5. The filter as in Claim 4 wherein said two etalons are tuned to produce transmission peaks on both sides of said first resonant frequency and feedback control to maintain said diode laser operation at said resonant frequency based on input signals from said two frequency locking detectors.

6. The filter as in Claim 1 wherein said metal vapor is rubidium.

7. The filter as in Claim 1 wherein at least one magnet is two permanent magnets.

8. The filter as in Claim 7 wherein said two permanent magnets are two ring magnets.

9. The filter as in Claim 1 wherein said at least one magnet is an electromagnet.

10. The filter as in Claim 1 wherein said vapor cell defines beam direction and at least one magnet is oriented to produce a magnetic field parallel to said beam direction.

11. The filter as in Claim 1 wherein said vapor cell defines a beam direction and said at least one magnetic is oriented to produce a magnetic field perpendicular to said beam direction.

12. A tracking system comprising:

(A) a metal vapor cell having an optical entrance port and an optical exit port and containing a metal vapor defining a first excited energy state, defining a first resonant frequency, and a second excited energy state and having at least one absorption line, at or near a desired filter wavelength, said absorption line being equal, in energy, to a difference between the second excited state and the first excited state;

(B) a beacon laser system for producing a beacon laser beam at a wavelength within said narrow spectral band.

5 13. The tracking system as in Claim 12 wherein said beacon laser is configured to produce a beacon laser beam with a divergence of at least 20 degrees.

10 14. The tracking system as in Claim 12 wherein said beacon laser using system comprises two frequency locking etalons and two frequency locking detectors for monitoring sample portions of said beacon laser beam.

15 15. The filter as in Claim 14 wherein said two etalons are tuned to produce transmission peaks on both sides of said first resonant frequency and feedback control to maintain said diode laser operation at said resonant frequency based on input signals from said two frequency locking detectors.